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Approved For Release 2004/03/26 : CIA-RDP78T04743A000100070001-6

PID/ABCB 5-64
13 January 1964

MEMORANDUM FOR: Chief, Atomic/Biological/Chemical Division, OSI

ATTENTION:

THRU: Chief, Requirements Branch, Reconnaissance
Group, CGS

FROM: Chief, CIA/PID(NPIC)

SUBJECT: Search for Mine & Mill Possibly Associated with
Nuclear Energy Material Production in the Vicinity
of Nan-Hsiung, Kwangtung Province, China

REFERENCES: Requirement No. C-SI3-80,556
CIA Project No. C 1269-63

1. The old tungsten mining region to the north and east of Nan-hsiung, Kwangtung Province, China was searched for an indication of atomic energy activity for a radius of 25 nautical miles (nm) on fair to good quality aerial photography. The mineralized regions to the south and west of Nan-hsiung have been examined for a number of previous requirements such as OSI/R-216/62 and OSI/R-19/63, and answered together in IOM PID/ABCB 129/63, dated 13 June 1963. Copies of the reply are available in the files of OSI. Detailed descriptions and maps showing the prospects are available in the files of the Atomic/Biological/Chemical Branch, where they may be consulted. Information on the geology of the tungsten deposits can be found in Hsiu, K.C. and Ting, I., "Geology and Tungsten Deposits of Southern Kiangsi": Geological Survey of China, Memoir, Series A, No. 17, 1943, English and Chinese texts. A separate colored geological map accompanies the report which includes the Nan-hsiung region.

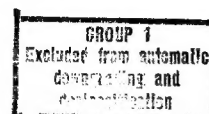
2. Six nautical miles south of Nan-hsiung, in the foothills of the Nanling mountains near the village of Shang-K'ung, a newly built highway is seen to terminate in a rejuvenated mining district at 25-01N 114-18E. The Shang-K'ung mining camp is located 23 nm south-southwest of the old and large tungsten mill southwest of Ta'yu, and 40 nm northeast of Chu'chiang, around which there have been many reports of various atomic energy activities. According to Hsiu and Ting the Shang-K'ung mining district is underlain by the Nanling granite.

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The Shang-K'ung mining camp can be compartmentalized into four areas from higher to lower elevations or from west to east: (1) a sentry post and a highway gate fronting a road worker's housing and warehouse area; (2) a miner's barrack housing area; (3) an enclosed centrally located supply area and three ore-treatment plants or mills; and (4) a well prospected or trenched area with 17 new mines. On a ridge to the east and on a ridge to the west are two possible observation posts giving unobstructed views of the mining camp and the access road from Nan-hsiung.

3. Prospecting in the Shang-K'ung mining district, judging from the absence of spoil along three short faint trenches and one long dim trench was carried out many years ago from the narrow steep service road. More recent spoil and wash from the trenches indicates that about 5 to 7 years ago trenching was renewed and proceeded farther out and upward. Altogether 33 short trenches and 12 long trenches (well over 100 feet in length) are visible. There are also some pits and excavations of the rather thin soil to expose the underlying granite. The trenches can be further classified into two systems: (1) Nine trenches which trend east and west and possibly are on tungsten-bearing veins; and (2) thirty six veins or trenches which trend northwest-southeast and possibly contain rare minerals, such as those containing uranium.

[redacted] which shows the district on far oblique photography, almost concealing the trenches, indicates that prospecting is diminishing and is being superseded by mining.

4. Mining in the Shang-K'ung district is carried on by three adits or tunnels driven into the east side of the mountain and by some fourteen other mines or deepened trenches along the north and west mountain slopes. The exact number of mines is debatable, certainly in regard to their production and quality of ore produced. Each of the trench-type mines has an associated pile of waste rock spread out on the slope below, a bare working or sorting area with piles of crushed ore, frequent narrow trails leading to nearby tributary trenches, and a wider trail connecting the mine with a better road, which leads in turn to the mill. One of the mines is working the east-west tungsten vein system by means of a long trench. The other mines work the northwest-southeast possible rare mineral vein system.

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5. The Shang-K'ung mining district is estimated to have produced about 60,000 short tons of tungsten and rare mineral-bearing ore in the past three years, substantially from the northwest-southeast trending veins. Perhaps 3,000 tons of ore may be stockpiled at the mines. Pending the construction of a central mill and a newer and perhaps more advanced processing facility, about one third or 20,000 tons of ore, possibly mainly tungsten ore, was crushed and sorted at a primitive mill. Because of the evidences of security, the indications of a large production from northwest-southeast trending veins, and a considerable investment in road and supplies, the possibility that uranium is being mined in this district must be considered. If a production of 10,000 tons of mainly tungsten ore in the first year of mining from the east-west vein system is granted, then the remaining 50,000 tons of ore from the northwest-southeast veins may have contained from 10 to 20 short tons of U_3O_8 equivalent, and the annual rate of production to have been of the order of 5 to 10 tons of U_3O_8 . The recovery of the contained uranium probably was no more than three quarters or 75 percent of the above tonnages however.

6. Three ore concentration mills are located in the Shang-K'ung mining district. They will be described here from south to north or from the oldest to the newest installations.

(1) The south or old mill is a dark short rectangular structure located at the bottom of a long steep slope of the west side of the upper valley. Considerable waste or tailings have accumulated below the mill, representing about 20,000 short tons of ore or one third of the production of the district. The mill is believed to contain only simple crushing and grinding equipment.

(2) The central mill, so-called because it is centrally located in the mining district is a long inclined rectangular structure subdivided into six nearly equally sized sections, constructed along a steep westward-facing slope. The six sections may be identified from the top to the bottom of the slope as follows: A - Receiving, B - Storage, C - Crushing, D - Grinding, E - Tabling or Vanning, and F - Sacking and Storage or Mill Product.

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Adjoining the fourth or grinding section is a short rectangular dark one story service building, situated at an acute angle to the axis of the mill. A narrow road leads down from the sixth section into a supply-storage area on the valley floor. The ore treated in this mill is believed to come mostly from two mines south of the mill on the east side of the valley. Two tailings dumps at the mill, particularly a light-gray toned waste pile from the jigs or vanners, have nearly doubled in volume during the interval between [REDACTED]

[REDACTED] Most of the mined ore and rock are believed to be retained at the mill, indicating that only a valuable or sparsely distributed mineral is extracted. A careful estimate of the volume of the tailings pile at the central mill was made, with allowance for obliquity of the photography, slope of the ground, etc., with the following results: crushed granite, in an uppermost dump, 1,500 short tons; ground granite and ore in a dump mid-way down the slope, 15,000 tons; and the lowermost dump of tumbled or milled ore, 5,000 tons. If the central mill has been operating about three years, the rate of treatment of ore is about 7,000 tons per year. The central mill is roughly estimated to have treated about one-third of the total ore mined in the district.

(3) The newest or northern mill, treating ore from a nearby mine higher up the slope, probably began operating in the last quarter of 1962. The northern mill located a short distance north of the central mill is built on the same steeply inclined westward facing slope. It comprises a temporary ore storage building at the top of the slope, which rises above a short rectangular metal-roofed crusher building. Adjoining the crusher but down-slope and at right angles to it is a brick building with three gables over three equi-sized bays. The two upper bays are believed to be grinding and vanning or tabling sections, respectively. The third or lower bay is possibly a chemical treatment section. [REDACTED] six piles of bricks are seen at the southwest corner of the lower bay. [REDACTED] dimly shows that a low black structure with a possible low stack in an enclosed area, has been built in the middle of the west side of the bay. Immediately adjoining the low black structure on the north is a small area whitened as if by a powdery white chemical reagent. This area is hemmed in on the northwest by a low black pile, possibly of coal. The suggested chemical reagent preparation structure is centrally

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located to serve a still lower wide bay of another structure, a two-gabled building. The upper or wide bay could serve as a chemical treatment and precipitation hall. The precipitated product could then be moved into the adjoining lower and narrower bay for assay, packing, and storage. A small grey-toned waste pile south of the black structure seems to indicate that the chemical section has only recently begun to operate.

The volumes of the two tailings piles found on the north and south sides of the new northern mill were carefully estimated on [] with due allowance for the obliquity of the photography, slope of the ground, apparent granularity of the tailings, etc., as follows: Crushed dark rock, north of the three-gabled building, 500 short tons; a crushed granite-like rock located adjacent to and south of the crusher, 3,000 tons; a pile of granite-like ground rock farther south and adjoining the ground rock pile of the central mill, 8,500 tons. A total of 12,000 tons of discarded rock has accumulated since a mere trace of tailings was noted on []

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7. Below the central mill at a wide place in the narrow valley is a long rectangular building with a gable roof, apparently a combination warehouse and shop. Surrounding this building are a number of smaller buildings or shops forming a supply area. The areas between the buildings are seen to be nearly empty on [] As seen on the far oblique [] the buildings are surrounded by 12 small piles of boxes, 5 longer piles of possible pit props and other supplies. [] shows six low dark vertical tanks such as might be used for holding liquid reagents, near the south side of the long rectangular building. The importance of the supply area is further shown by the construction of a barrier fence and two new gates across the roads leading into the supply area.

8. Adjoining the supply area on two sides but outside the barrier fence, are twelve long rectangular communal and housing (barrack) type buildings. The main road from Nan-hsiung passes through the housing area to terminate in the supply base. Along this main road above the housing area is a service building and possible POL base. Still higher and just off the road on the

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north side are six long barrack-like buildings, 2 of which are seen to be new on [REDACTED] These buildings may house food and personnel supplies for mine, mill, and highway transport and maintenance employees. Laborers and truck drivers could enter this upper barrack-warehouse area without having to intrude into the mine and mill areas below. Adjoining the upper barrack-warehouse area along the road is a security building constructed near the road and a highway gate. A little farther up the road and at the west end of the camp is a white guard or sentry post. Adjoining the barrack-warehouse area, down slope away from the access road, is a square fenced field which serves as a corral.

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9. A new service road is shown on [REDACTED] running six nm from a supply base on the south side of Nan-hsiung at 25-06N 114-18E, to the entry control point of the Shang-K'ung mining district at 25-01N 114-18E. The road had been only recently completed as short breaks in its trace are seen to have been caused by unstable banks sliding across the road. The breaks are seen to have been repaired on Mission [REDACTED] The new longer road with easier grades replaces an older less winding but steeper old road, as shown on the AMS, Kan-hsien mapsheet, which continues on south but to the west of the Shang-K'ung mining district.

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10. The Nan-hsiung Transit/Shipments Supply Depot is located on the south side of the Cheng Chiang (River) above the high-water level, across from the city of Nan-hsiung, at 25-06N 114-18E, immediately upstream from a temporary bridge into the city. [REDACTED]

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[REDACTED] five rows of box-like merchandise can be seen. The boxes are apparently unloaded from a large fleet of small river boats (sampan) drawn up nearby, on to a primitive soil landing stage. Conceivably some of these boxes, which may have once contained supplies, could hold a small amount of concentrates for shipment probably downstream to the rail head at Chu-chiang -- about which there long have been reports of activity in radioactive minerals. The little used road which leads away to the south indicates that the depot is new and only a small amount of concentrates has been shipped from the mine or vice versa only small quantities of supplies have been dispatched to the mining district.

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11. [REDACTED]

[REDACTED] show a low-water stage of the Cheng-Chiang (River) and the empty resting places (depressions) of the river boats (sampans). The five rows of boxes of fourteen months earlier have nearly all been hauled away. Their disappearance seems to be correlated with their possible reappearance by a direct road movement into the supply area of the Shang-K'ung mining district. Two new rectangular warehouses have been built nearby. Newly appeared are two long piles of lumber, two areas of miscellaneous merchandise, an area on higher ground containing 14 piles of lumber or pit-prop like timber. A long narrow and possibly canvas covered smooth pile, estimated to be 15 feet wide by 120 feet long by 10 feet high has been set up farther south along the west side of the south access road. The south access road by [REDACTED] shows much usage and is wider than it appeared on [REDACTED]. The depot now seems organized for regular and continuous service. Its activities will be controlled by the levels of the river stages.

12. The Nan-hsiung Oil Storage Depot, is located in an enclosed area, adjacent to a good road, in the northeast part of the city at 25-07N 114-19E. [REDACTED]

[REDACTED] shows four in-line unrevetted vertical tanks and a tank scar with valve and control houses and adjoining two medium-sized gabled rectangular service buildings. The tank area adjoins a walled-in school or research like area, which is also associated with an entrance control building and a nearby long rectangular service-type building, with an adjacent line of tubular-like objects. The tank and research areas appear unchanged on Mission [REDACTED]

[REDACTED] though the line of objects is greatly reduced. Although the areas could be associated with a mine and mill undertaking their location at the opposite or northeast end of the city and their relative inactivity in an oil-seed producing farming region, leads to their exclusion as a mineral treatment plant.

13. Photography and maps used in the preparation of this memorandum on mines and mineral prospects north and east of Nan-hsiung are as follows:

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Maps

USATC, Series 200, 498-17A, Scale 1:200,000, April 1959. Secret
AMS, Series L500, NG 50-9, Kan-hsien map sheet, scale 1:250,000,
April 1959, Unclassified. Source for the place name Shang-
K'ung the title used here for the mining district.

14. The photo analyst on this project was [redacted]
He may be contacted on extension [redacted] should you have further
questions regarding this requirement.

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15. This memorandum with enclosure completed the referenced
requirement.

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Enclosures:

(Photostat of Map - AMS, L-781)
CIA/PID/ABCB/P-25/64 (Annotated Photo Enlargement)
(Total of 2)



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